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(54) Treating Condensation in Double Glazing Panels

PATENTS
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(72) Collins, Stephen G. , Canada

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TREATING CONDENSATION IN DOUBLE GLAZING PANELS

This invention relates to glazing panels and is especially concerned with removing condensation from, and/or preventing condensation in, the interior of a panel of double
5 glazing.

According to one aspect of the invention, a glazing panel comprises two panes of glazing material, one of said panes having an orifice, a peripheral spacer between the panes and bounding an enclosed volume, and a filter means in the form of
10 a patch having marginal regions attached to said one of said panes and supported by the glazing material surrounding said orifice, and a medial membranous filter screen extending across the mouth of the orifice, said filter screen having interstices sized to permit the egress of moisture-laden air from the panel
15 when its interior temperature and pressure are elevated relative to ambient and to inhibit ingress of moisture droplets with ambient air when the interior temperature of the panel is greater than ambient and its interior pressure is less than ambient.

According to a second aspect of the invention, there
20 is provided filter means for use in covering an orifice in a pane of glazing material, said filter means comprising a marginal region for attaching to said pane around said orifice and a medial region comprising a membranous filter screen extending across the mouth of the orifice, said filter screen having
25 interstices sized to permit the egress of moisture-laden air from the panel when its interior temperature and pressure are elevated relative to ambient and to inhibit ingress of moisture droplets



with ambient air when the interior temperature of the panel is greater than ambient and its interior pressure is less than ambient.

According to a third aspect of the invention, there is
5 provided a method of inhibiting ingress of moisture into a glazing panel comprising at least two panes of glazing material and peripheral spacing means separating said panes and forming a peripheral boundary of an enclosed volume, said method including the steps of creating an orifice in one of said panes
10 and closing said orifice by means of a filter means in the form of a patch having a marginal region and a medial filter membrane, said filter means being attached by adhering its marginal regions to the glazing material surrounding said orifice such that the filter membrane extends across the orifice, said filter membrane
15 having interstices sized to permit the egress of water vapour from the panel when its interior is warmer than the ambient air and to inhibit ingress of moisture droplets when its interior is cooler than the ambient air.

According to a fourth aspect of the invention, there
20 is provided a method of removing moisture from, and inhibiting ingress of moisture into, a glazing panel comprising at least two panes of glazing material and peripheral spacing means separating said panes and forming a peripheral boundary of an enclosed volume, said method including the steps of creating at least one
25 orifice in one of said panes; evacuating moisture from said enclosed volume; and applying a filter means to said one of said panes, a medial region of said filter comprising a medial

membranous filter screen to extend across the mouth of the orifice, said filter screen having interstices sized to permit the egress of moisture-laden air from the panel when its interior temperature and pressure are elevated relative to ambient and to inhibit ingress of moisture droplets with ambient air when the interior temperature of the panel is greater than ambient and its interior pressure is less than ambient, the filter means being attached by its marginal regions to said one of said panes such that said filter screen covers said orifice to filter air passing therethrough.

The filter means may comprise a single piece of filter material, for example mesh, the surrounding marginal regions of the piece of filter material overlying, and being bonded by adhesive to, the glazing material surrounding the orifice. The medial region of the material, which is not obstructed by adhesive, overlies the orifice and serves to filter air passing through it.

In preferred embodiments of any of the afore-mentioned aspects of the invention, the filter means comprises a piece of material with a central hole, and a filter membrane extending across the hole and secured to the material by adhesive. The marginal region of the material may then have a film of adhesive for attaching it to the pane of glazing.

This invention applies to panels which have already been manufactured as well as panels in the process of manufacture.

Further features and advantages of the invention will be apparent from the following description, given by way of a non-limited example with reference to the accompanying drawings in which:

5 Figure 1 is a diagrammatic sectional view of a panel according to the invention showing an orifice closed by a filter;

 Figure 2 is a diagrammatic sectional view of a modification of this panel; and

10 Figure 3 is a diagrammatic sectional view of a panel with a second orifice closed by a seal.

 In the Supplementary Disclosure;

 Figure 4 is a diagrammatic sectional view, corresponding to Figure 1, of a further embodiment; and

15 Figure 5 is a perspective view of the filter element of the further embodiment.

 In the different figures, corresponding parts have the same reference number but different suffixes.

 Figure 1 shows a partial sectional view of a typical glazing panel with the improvement according to the invention. 20 This panel consists of a glazing pane 1 and a second glazing pane 2 separated by a conventional peripheral spacer (not shown) to enclose a layer of air. Formed in proximity to one edge of the glazing pane 2, is an orifice 4 of advantageously cylindrical shape.

25 Filter means 6 is bonded to the glass surrounding the orifice 4 by adhesive 5. Filter means 6 comprises a patch 7 with an aperture 8 which allows air to communicate with the enclosed

layer of air 3. The aperture 8 is covered by a membrane 9 of suitable filtering material, for example mesh, adapted to remove moisture and foreign material from the air passing therethrough. The edges of the membrane 9 extend around the aperture 8 and are thus bonded to the patch 7 by the adhesive 5. The patch 7 is installed to the window pane 2 so that the membrane 9 overlies the orifice 4. The adhesive 5 bonds the patch 7 to the glazing material surrounding the orifice 4. The air layer 3 vents through the filter membrane 9 and the aperture 8 in patch 7. This embodiment avoids the accumulation of gas pressure and moisture by venting the layer of air 3.

An alternative form of filter means which overlies the glazing material surrounding the orifice is shown in the embodiment of Figure 2.

With reference to Figure 2, in this embodiment the filter means 6A is a patch of a suitable filtering material adapted to remove moisture and foreign material from the air passing therethrough.

The patch 6A comprises a single piece of filter material which is bonded by its margins to the pane 2 by adhesive 5A. The central area 9A of the filter material is unobstructed by adhesive 5 and so serves to filter air passing through the orifice 4.

The present invention allows an easy and inexpensive way to vent multi-glazing panels with at least one aperture and filter to suit various climatic conditions.

Embodiments of the present invention improve the mechanical integrity and the condensation resistance of double or multi-layered glazing panels, if exposed to extreme temperatures. Because the filter means is mounted directly to the glazing panel with direct communication to the orifice in the glazing panel, the arrangement is independent of whatever frame or sash surrounds it. The glazing alone supports and aligns the filter. Many hermetically sealed glazing panels, with or without desiccant, accumulate condensation and dirt between the glazing, over a number of years.

Embodiments of the invention provide for direct access to the space between the glazing panels upon removal of the filter, allowing easy removal of water and dirt, not readily attainable with other designs. The vented glazing panel is not subject to excessive differences in gas pressure thereby improving fire safety. Since the glazing panel and filter are independent of the frame or sash they may be retro-fitted into existing window frames.

Although only one orifice has been shown and described in the specific embodiment, it should be appreciated that more than one orifice might be provided, to facilitate the evacuation of moisture, providing at least one has the filter means to close it. The other(s) may also have filter means, or be hermetically sealed, as shown in Figure 3, by a seal 12 bonded by a film of adhesive 5D to cover a second orifice 11, when the interior of the panel is dry enough.

While references to specific embodiments describing the invention have been made, it must be understood that the scope of the invention is in no way limited thereto, it being possible to make various modifications of shape, disposition or material without departing from the scope of the invention defined in the accompanying claims.

SUPPLEMENTARY DISCLOSURE

The patch 7 may be made of synthetic plastics material, conveniently vinyl. The filter membrane may be stainless steel.

It will be understood from the main disclosure that the fineness of the mesh is determined so as to allow moisture to be expelled from the window through the filter as the window heats due to natural sun light. On the other hand, the mesh restricts ingress of water droplets as air is drawn back into the window as it cools. In practice, a stainless steel mesh with 10,000 holes per square inch has been found to be particularly suitable since it will pass moisture-laden air at the somewhat elevated temperatures involved when the air layer 3 is venting to the exterior, but will inhibit the ingress of moisture at the somewhat lower temperatures involved when the panel is cooling and which would be conducive to the formation of condensation within the panel. It is envisaged, however, that the number of holes per square inch could be anywhere in the range 6,000 to 20,000.

Figures 4 and 5 show a further embodiment in which the aperture 8C has a flap 10 attached to the annular vinyl patch 7C

by a short web 11. The flap 10 extends across the orifice 8C to obscure it and prevent water from entering the panel under, for example, driving rain conditions, yet is offset outwardly to allow moisture-laden air to exit through aperture 8C. The flap 10 may conveniently be provided when stamping out the patch 6C by using a die which will cut a major portion of the perimeter of the flap 10, but not all of it, so leaving web 11 intact, and will also offset the flap portion, thus providing the aperture 8C and the flap 10 in the same operation.

It will be appreciated from the main disclosure that the invention may be applied to window panels during manufacture. Since the trapped air is relatively dry, the patch can be applied without special cleansing of the interior of the window panel. Should the panel develop the small peripheral leaks typical of such panels after installation, the filter will inhibit condensation. Alternatively, the invention may be used to remove condensation from installed panels. This simply entails drilling a hole through one pane of the panel; purging the interior of the panel to remove the moisture; and applying a filter patch to the orifice to reseal the panel.

Where the window is exposed to sunlight, the purging may be achieved by exposing the window for a period of time dependent upon the degree of exposure. The heat of the sun will evaporate the moisture within the panel and it will be exuded from the panel. When the panel is clear, the patch is applied as previously mentioned.

Alternatively, where the panel is not exposed to sunlight, for example the double glazing panel of a freezer door, the panel may be purged by flooding it with methyl hydrate or by refrigeration or by passing a desiccant gas through it.

5 Whereas a new window panel, being dry already, will need only one hole to receive the filter patch, it is preferable for two holes to be made in a panel that is being refurbished. The holes are positioned at opposite edges of the pane and facilitate the cleansing process. Where heating by sunlight is
10 relied upon to remove moisture, the two holes assist convection. Where purging is employed, the purging fluid will be inserted through one hole and reclaimed through the other.

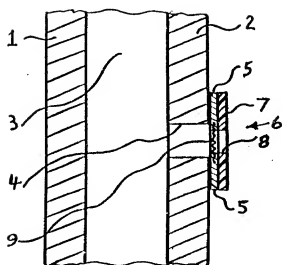


FIG. 1

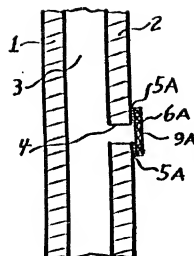


FIG. 2

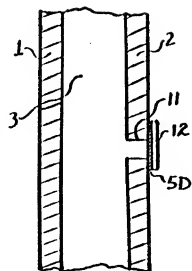


FIG. 3

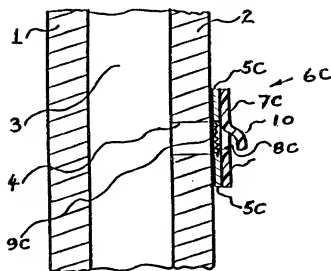


FIG. 4

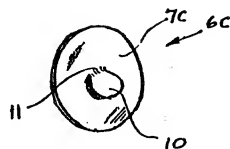


FIG. 5

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THE EMBODIMENTS OF THE INVENTION IN WHICH AN EXCLUSIVE RIGHT OR PRIVILEGE IS CLAIMED ARE DEFINED AS FOLLOWS:

1. A glazing panel comprising two panes of glazing
5 material, one of said panes having an orifice, a peripheral
spacer between the panes and bounding an enclosed volume, and a
filter means in the form of a patch having marginal regions
attached to said one of said panes and supported by the glazing
material surrounding said orifice and a medial membranous filter
10 screen extending across the mouth of the orifice, said filter
screen having interstices sized to permit the egress of moisture-
laden air from the panel when its interior temperature and
pressure are elevated relative to ambient and to inhibit ingress
of moisture droplets with ambient air when the interior
15 temperature of the panel is greater than ambient and its interior
pressure is less than ambient.

2. A glazing panel as claimed in claim 1, wherein said
patch comprises a unitary piece of filter material, said filter
20 membrane comprising a medial portion thereof overlying said
orifice.

3. A glazing panel as claimed in claim 1, wherein said
patch comprises a piece of material with a central hole and said
25 filter membrane extends across said hole and is attached
peripherally to said material around said hole.

4. A glazing panel as claimed in claim 1, wherein marginal areas of said patch are adhered to the pane by adhesive.

5. A glazing panel as claimed in claim 1, wherein said membranous filter screen comprises mesh.

6. Filter means for use with a glazing panel comprising at least two panes of glazing material one of the panes having an orifice, said filter means comprising a marginal region for attaching to said one of the panes around said orifice and a medial region comprising a membranous filter screen to extend across the mouth of the orifice, said filter screen having interstices sized to permit the egress of moisture-laden air from the panel when its interior temperature and pressure are elevated relative to ambient and to inhibit ingress of moisture droplets with ambient air when the interior temperature of the panel is greater than ambient and its interior pressure is less than ambient.

7. Filter means as claimed in claim 6, comprising a unitary piece of filter material, said screen comprising a medial portion thereof.

8. Filter means as claimed in claim 6, comprising a patch of material with a central hole, said screen extending across said hole and being attached peripherally to material around the hole.

9. Filter means as claimed in claim 6, wherein a marginal area of said filter means carries adhesive for attaching said filter means to said pane.

10. Filter means as claimed in claim 6, wherein said screen comprises mesh.

11. A method of inhibiting ingress of moisture into a glazing panel comprising at least two panes of glazing material and peripheral spacing means separating said panes and forming a peripheral boundary of an enclosed volume, said method including the steps of creating an orifice in one of said panes and closing said orifice by means of a filter means in the form of a patch having a marginal region and a medial filter membrane, said filter means being attached by adhering its marginal regions to the glazing material surrounding said orifice such that the filter membrane extends across the orifice, said filter membrane having interstices sized to permit the egress of moisture-laden air from the panel when its interior temperature and pressure are elevated relative to ambient and to inhibit ingress of moisture droplets with ambient air when the interior temperature of the panel is greater than ambient and its interior pressure is less than ambient.

12. A method of removing moisture from, and inhibiting ingress of moisture into, a glazing panel comprising at least two panes of glazing material and peripheral spacing means separating

said panes and forming a peripheral boundary of an enclosed volume, said method including the steps of creating at least one orifice in one of said panes; evacuating moisture from said enclosed volume; and applying a filter means to said one of said
5 panes, a medial region of said filter comprising a medial membranous filter screen to extend across the mouth of the orifice, said filter screen having interstices sized to permit the egress of moisture-laden air from the panel when its interior temperature and pressure are elevated relative to ambient and to
10 inhibit ingress of moisture droplets with ambient air when the interior temperature of the panel is greater than ambient and its interior pressure is less than ambient, the filter means being attached by its marginal regions to said one of said panes such that said filter screen covers said orifice to filter air passing
15 therethrough.

CLAIMS SUPPORTED BY SUPPLEMENTARY DISCLOSURE

13. A method as claimed in claim 12, comprising the step
20 of providing a second orifice in said pane, and said step of evacuating moisture includes admitting purging fluid through one of the two orifices and reclaiming it through the other of the two orifices.

25 14. A glazing panel as claimed in claim 1, wherein said filter means comprises a flap extending across said screen and being disposed away from said screen to permit passage of air

therethrough while shielding said screen from direct exposure to rain.

15. A glazing panel as claimed in claim 3, wherein said patch comprises a flap attached to said material around said hole, said flap extending across said hole and being disposed away from said hole to permit passage of air therethrough while shielding said screen from direct exposure to rain.

16. A glazing panel as claimed in claim 1, wherein said screen has between six thousand and twenty thousand holes per square inch.

17. A glazing panel as claimed in claim 1, wherein said screen has about ten thousand holes per square inch.

18. Filter means as claimed in claim 6, further comprising a flap attached to said marginal region and projecting across the screen to obscure said screen, said flap being disposed away from said screen to permit air flow therethrough while shielding said screen from direct exposure to rain.

19. Filter means as claimed in claim 8, further comprising a flap attached to said material around said hole, said flap extending across said hole and being disposed away from said hole to permit passage of air therethrough while shielding said screen against direct exposure to rain.

20. Filter means as claimed in claim 6, wherein said screen has between six thousand and twenty thousand holes per square inch.

21. Filter means as claimed in claim 6, wherein said screen has about ten thousand holes per square inch.

22. A glazing panel as claimed in claim 1, wherein said patch comprises a piece of material with a central hole and a flap formed by a portion of the material displaced in forming said central hole, said membranous filter screen extending across said hole and being adhered peripherally to said material around said central hole, said flap being attached to said material around said central hole and being disposed away from said central hole to extend across said central hole and permit passage of air therethrough while shielding said membranous filter screen from direct exposure to rain.

23. Filter means as claimed in claim 6, wherein said patch comprises a piece of material with a central hole and a flap formed by a portion of the material displaced in forming said central hole, said membranous filter screen extending across said hole and being adhered peripherally to said material around said central hole, said flap being attached to said material around said central hole and being disposed away from said central hole to extend across said central hole and permit passage of air therethrough while shielding said membranous filter screen from direct exposure to rain.



ABSTRACT OF THE DISCLOSURE

In order to remove condensation from the enclosed volume of a double glazing panel an orifice is provided in one of the panes. When the moisture has been purged from the panel, a filter membrane, conveniently in the form of a patch, is attached to the pane to cover the orifice. The filter membrane is designed to allow the passage of air as the panel is heated, for example by sunlight, but inhibit the ingress of moisture as the panel cools again. The filter membrane may be a medial area of a unitary piece of mesh, the marginal portions of the mesh being attached to the pane. Alternatively, the patch may comprise a piece of material with a central hole and the filter membrane may overlies the hole. The marginal regions of the patch may have a film of adhesive for attaching the patch to the pane.